Planning and Studying Improvement in Patient Care: The Use of Theoretical Perspectives

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A consistent finding in articles on quality improvement in health care is that change is difficult to achieve. According to the research literature, the majority of interventions are targeted at health care professionals. But success in achieving change may be influenced by factors other than those relating to individual professionals, and theories may help explain whether change is possible. This article argues for a more systematic use of theories in planning and evaluating quality-improvement interventions in clinical practice. It demonstrates how different theories can be used to generate testable hypotheses regarding factors that influence the implementation of change, and it shows how different theoretical assumptions lead to different quality-improvement strategies.

Keywords: Theories, quality improvement, health care.

SOMETIMES NEW SCIENTIFIC FINDINGS, BEST PRACTICES, or clinical guidelines are easily implemented in practice. Most of the time, however, improving patient care is not easy, particularly if an innovation requires complex changes in clinical routines, better collaboration among disciplines, changes in patients' behavior, or changes in the organization of care. To date, the majority of health care improvements have been targeted at factors related to individual professionals, particularly their knowledge, routines, or attitudes (Grimshaw et al.

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2004), although improvement may be impeded by a much broader range of economic, administrative, and organizational factors or those relating to patients' beliefs or behavior.

Because the interaction of factors at multiple levels may influence the success or failure of quality-improvement interventions (Ferlie and Shortell 2001; Grol 1997; Shortell et al. 2000), an understanding of these factors (the obstacles and incentives for change) is crucial to an effective intervention (Grol and Grimshaw 2003; Grol and Wensing 2004; van Bokhoven, Kok, and van der Weijden 2003). An understanding of the theoretical assumptions and hypotheses behind these factors is necessary as well, as it enables the consideration of theory-based interventions for quality improvement. Currently, however, the specific model or approach is usually based on implicit (and potentially biased) personal beliefs about human behavior and change (Grol 1997).

In this article we summarize and recommend a set of theories regarding change in health care and argue for a more systematic use of theories in planning and evaluating changes in clinical practice, by following and extending previous overviews of theories (e.g., Ashford 1998; Greenhalgh et al. 2004; Kitson, Harvey, and McCormack 1998; Michie et al. 2005; Robertson, Baker, and Hearnshaw 1996).

The Complexity of Changing Practices

In their excellent attempt to develop a unifying model of the diffusion of innovations in health care, Greenhalgh and colleagues (2004) found that the available (theoretical) literature on this issue is large, diverse, and complex. They pointed at the problem of the multiple and often unpredictable interactions arising in particular contexts and settings that determine the success or failure of implementing changes. Their article also is valuable in recommending research priorities, such as the need for studies of hypothesized links between interventions and outcomes and the need for refinement of the mechanisms by which and within which these links produce (or fail to produce) change. Research and planning for change should recognize the interaction between an intervention and the complex setting in which it is used. In their study of factors influencing the improvement of coronary bypass surgery, Shortell and colleagues (2000) also identified the need for a more detailed analysis of how microsystems of care provision can be improved by combinations of interventions at different levels.

The Use of Theories in Planning and Evaluating Change Interventions

The perspective taken in this article is that for most changes in health care, a range of factors interact at different levels (patients, professionals, interactions among professionals in teams, the organizational context, and the economic and political context) to determine whether and to what extent change is achieved. For any innovation to be implemented successfully, it is necessary to identify the potential interacting determining factors. In turn, these factors can be described by and derived from different theories that need to be tested for their single or combined influence on change. This approach requires understanding the range of available theories and their applicability to health care. Although theories can be found in many disciplines and scientific areas, not all have been used in research on change in health care. This article discusses those theories regarding various levels of health care provision that provide different, and sometimes contrasting, hypotheses about how to improve patient care effectively. We also offer two practical examples to show how theories can be used to generate ideas for planning or researching change interventions.

Types of Theories

A *theory* may be defined as "a system of ideas or statements held as an explanation or account of a group of facts or phenomena" (Michie and Abraham 2004, 33). Because theories differ widely in their focus, perspective, and underlying paradigms, Rossi, Freeman, and Lipsey (1999) divided them into impact theories and process theories. *Impact theories* describe hypotheses and assumptions about how a specific intervention will facilitate a desired change, as well as the causes, effects, and factors determining success (or the lack of it) in improving health care. *Process theories* refer to the preferred implementation activities: how they should be planned, organized, and scheduled in order to be effective (the organizational plan) and how the target group will utilize and be influenced by the activities (the utilization plan). The ideal model for change in health care would encompass both types of theories. Next we briefly summarize process theories and propose a planning model derived from them. This model provides the context for the rest of the article, which focuses on an exemplary set of impact theories and the relevant factors derived from them.

Methods

We included those theories that seemed relevant or referred directly or indirectly to quality improvement and the implementation of change in health care. These theories also had to be recognized by the relevant discipline and had to have been applied to health care. To identify these theories, we first consulted previous overviews (Ashford 1998; Fleuren, Wiefferink, and Paulussen 2004; Greenhalgh et al. 2004; Hulscher, Wensing, and Grol 2000; Kitson, Harvey, and McCormack 1998; Moulding, Silagy, and Weller 1999) and then looked at a wide range of journals in health care and social sciences dating between 2000 and 2002. Besides searching electronic databases using the terms *theory/change*, we hand-searched a number of journals (*British Medical Journal*, *Quality and Safety in Health Care*, *Internal Journal for Quality in Health Care*, *Technovation*, and *The Milbank Quarterly*). Our preliminary selection was discussed at an international meeting of experts on implementation of change (as part of a European Union–funded project). We continued the searches until we could find no further relevant theories.

Next we categorized the theories as either process or impact and summarized the key principles of process theories. We differentiated the impact theories according to ecological level: individual professional, social setting, organizational context, political context, and economic context. We wrote brief conclusions regarding each theory, focusing on its main constructs and the available evidence of its impact (Wensing et al. 2005). Finally, we devised illustrations of how each theory and its constructs translated into practical strategies for two quality challenges: the improvement of infection control or hand hygiene routines as examples of specific professional behavior, and the improvement of the management of patients with diabetes mellitus as an example of multidisciplinary performance.

Changing Practices: Hand Hygiene and Diabetes Management

Hand Hygiene

In many countries, one of the priorities for health care is reducing the number of hospital-acquired infections. Such infections are estimated to affect about one in eleven patients in the United Kingdom, with 13 percent mortality, two and a half times longer hospital stays, and an

additional cost per infected patient of about £3000 (about $5,600) (Stone 2001). Between 15 and 30 percent of such infections are considered to be preventable, particularly by better hand washing and disinfecting by professionals between contacts with patients.

The importance of hand hygiene has been recognized since the mid-1800s, starting with Ignaz Semmelweis, who found that hand disinfection reduced maternal morbidity in obstetric departments. Since then, much evidence has been found regarding the importance of good hand hygiene, as in a recent review of nine randomized trials (Pratt et al. 2001). Stone (2001) concluded that the treatment effect is so great that "if hand hygiene were a new drug it would be used by all" (280). This well-established evidence has been summarized and disseminated in the form of clinical guidelines to prevent hospital infections, and most clinical professionals have been instructed, at least formally, about its importance.

Even so, compliance by health workers in general and physicians in particular is known to be poor (Teare, Cookson, and Stone 2001). Although many hospitals have guidelines for preventing infections, they often are not followed. Indeed, because physicians largely overestimate their own hand hygiene (Handwashing Liaison Group 1999), the challenge is to change the use of hand-washing guidelines.

Diabetes Management

International consensus on optimal diabetes management emphasizes the continuous monitoring of diabetes patients to detect complications (particularly in arteries, eyes, feet, and kidneys). A study of thirteen hospitals (1,465 patients) in the Netherlands showed that not more than 23 percent of the patients had an HbA1C at the target level; 56 percent had a good cholesterol level; 40 percent had an acceptable body mass index; and 21 percent smoked. Clearly, there was much room for improvement in the examinations and the counseling of patients (Dijkstra et al. 2004). In a survey of general internists at ninety-six hospitals in the Netherlands, we asked about perceived problems in implementing national guidelines to prevent complications in diabetes (Dijkstra et al. 2000) and found problems with following the recommendations at different levels of health care (professionals, social context, organizational context, and economic context) (see table 1). An effective program for improvement would need to address most of these problems.

TABLE 1
Problems Perceived by Ninety-Six Internists in Following National Guidelines on Diabetes Management

Level	Problem	Percentage Perceiving This as a Real Problem
Professional		
Cognitions	No evidence for recommendations	36
	Lack of knowledge about optimal performance	35
Attitude/motivation	Guideline too rigid	58
	Resistance to imposed working method	53
Social context	No support from hospital management	46
	Disagreement among physicians about optimal performance	36
Organizational context	Extra work needed to adhere to guidelines	84
	Extra time needed to follow recommendations	56
	Lack of support staff	48
	Lack of ophthalmologist's capacity	45
Economic/political context	No financial compensation for extra work	59

Source: Dijkstra et al. 2000.

Theories of Change in Health Care

Process Theories

Process theories pertain to the actual implementation of change: how the different activities should be planned and organized in order to be effective (organizational plan) and how the target group is influenced by the activities (utilization plan). Our discussion here focuses only on their common elements. Grol, Wensing, and Eccles (2005) provide a more extensive description of each theory.

Most of the available models and theories are based on the same principles for the successful implementation of change (e.g., Bartholomew et al. 2001; Davis and Tailor-Vaisey 1997; Ferlie and Shortell 2001; Green and Kreuter 1991; Grol 1992, 1997; Grol and Grimshaw 2003; Kotler and Roberto 1989; Langley et al. 1996; Lomas and Haynes 1988; Mittman, Tonesk, and Jacobson 1992; Ovretveit 1999; Prochaska and Velicer 1997; Robertson, Baker, and Hearnshaw 1996; Rogers 1983, 1995). Although the scientific basis for these principles is still sketchy, they provide the following model for creating an implementation plan for health care (Grol and Wensing 2005b):

- Changing practice routines should take into account the complexity of the practice, as many factors may stimulate or hamper change. Effective implementation requires a systematic, well-planned approach that considers all relevant factors. This approach may use both the perspective of the "implementer" (the person, group, or body wanting to plan and achieve the change) and the perspective of the target group (professionals, team, practices, hospitals) receiving the proposal to change its performance.
- For the implementation to be successful, the entire target group must be committed to it. As far as possible, the target group should be involved in both the development of the innovation for change and the implementation plan.
- Attention should be given to the specific innovation to be implemented, for example, its scientific basis, the group or organization that developed it, and the ultimate form in which it is to be presented. Particular characteristics of innovations (proposed changes, new technologies, clinical guidelines) may promote or hamper their actual adoption (e.g., Grol et al. 1998; Orlandi 1987; Rogers 1983, 1995; Spence 1994; Wolfe 1994; Zaltman and Duncan 1977). Table 2 is an overview of such characteristics (Grol and Wensing 2005a). Although there has been little research on the impact of these characteristics on change in health care, recommendations that could easily be tried and stopped if they did not work were found to be associated with higher compliance rates (Grilli and Lomas 1994). A series of observational studies in primary care (Burgers et al. 2003; Foy et al. 2002; Grol et al. 1998) also found higher compliance rates with recommendations for practice that were based on evidence and compatible with existing values and that precisely

TABLE 2
Characteristics of Innovations That Might Promote or Hinder Their Implementation

Characteristic	Description
Relative advantage or utility	Better than existing or alternative working methods.
Compatibility	Consistent with existing norms and values.
Complexity	Easy to explain, understand, and use.
Costs	Balance between cost and benefits, necessary level of investment.
Risks	Degree of uncertainty about result or consequences.
Flexibility, adaptability	Degree to which innovation can be adapted to needs/situation of target group.
Involvement	Degree to which target group is involved in development.
Divisibility	Degree to which parts can be tried out separately and implemented separately.
Trialability, reversibility	Degree to which an innovation can without risk be tried out, stopped, or reversed if it does not work.
Visibility, observability	Degree to which other people can see and observe the results.
Centrality	Degree to which the innovation affects central or peripheral activities in the daily working routine.
Pervasiveness, scope, impact	How much of the total work is influenced by the innovation, how many persons are influenced, how much time it takes, and what the influence on social relationships is.
Magnitude, disruptiveness, radicalness	How many organizational, structural, financial, and personal measures the innovation requires.
Duration	The time period within which the change must take place.
Form, physical properties	What sort of innovation or change it is (material or social, technical or administrative, etc.).
Collective action	Degree to which decisions about the innovation must be made by individuals, groups, or a whole institution.
Presentation	Nature of presentation, length, clarity, attractiveness.

Source: Grol and Wensing 2005a.

defined the desired performance, that did not require new knowledge or skills, and that had limited consequences for management.

- Successful implementation often requires a sequential approach, with different problems resolved at each step. Individuals or subgroups within the implementation's target group may be in different phases of a process of change (see the next section). Because different subgroups may demand different approaches, the target group and the context for change must be well known. Therefore the implementation process requires a diagnostic or problem analysis to find out the reasons for departures from the desired performance, characteristics of the target group and setting, influential involved parties, and factors that could hamper or stimulate change.
- The choice of measures and strategies for changes should be linked as closely as possible to the results of the problem analysis. On this basis, a cost-effective mix of measures, such as education, feedback, rewards, or organizational changes, can be devised.
- Attempts to change clinical practice should be accompanied by a plan to monitor progress and to determine whether the intended changes are being achieved. On the basis of such an evaluation, the targets or the plan can be adjusted. The implementation of change should be a cycle in which the implementers learn from earlier steps in the process and continually improve their approach.
- The implementation plan must be incorporated into established structures for professional development and quality management in the target setting.

Stages-of-Change Theories

Several theories hypothesize that individual professionals and teams differ according to the "stage" of their change. Different "stages-of-change models" offer theoretical assumptions about the steps that professionals or teams in health care must take to achieve the intended changes. These models have many similarities, as shown in table 3.

Stages-of-change theories state that the stages differ according to the professionals' and teams' awareness of and motivation to perform a specific behavior. Each stage is governed by different factors and requires different strategies for change. Such theories naturally lead to the distinction of different subgroups or segments in a target group. For instance, Rogers's innovation-diffusion theory (1983) distinguishes among innovators, early adopters, early majority, late majority, and laggards with

TABLE 3
Stages in a Process of Change Proposed by Different Authors

Author	Stages								
	1	2	3	4	5	6	7	8	9
Zaltman and Duncan 1977	Knowledge/ awareness	Knowledge/ awareness		Attitude formation	Decision	Initial implementation		Sustained implementation	
McGuire 1981	Exposure/ interest	Comprehension	Skills	Attitude change/ agreement	Decision	Behavior change	Reinforcement	Consolidation	
Rogers 1983		Knowledge		Persuasion	Decision	Implementation		Confirmation	
Kok 1987	Attention	Understanding		Attitude change	Intention to change	Behavior change		Sustained change	
Orlandi 1987		Seeking information		Persuasion about relevance	Decision to adopt	Change of practice		Sustained change	
Cooper and Zinud 1990		Initiation			Adoption	Acceptance /use		Incorporation	Infusion (wide use)
Grol 1992	Awareness/ interest	Knowledge	Insight into own performance	Positive attitude	Intention to change	Implementation (trial)		Maintenance of change	
Spence 1994	Awareness/ interest			Evaluation		Trial		Adoption	
Pathman et al. 1996	Awareness			Agreement		Adoption		Routine adherence	
Prochaska and Velicer 1997	Precontemplation			Contemplation	Preparation	Action		Maintenance	

Note: 1 through 9 refer to different stages in a process of change proposed in different theories; they were ordered by the authors.
Source: Grol and Wensing 2005b.

respect to their search for information about innovations and the extent to which they are motivated to try and adopt new guidelines, techniques, and procedures. Another example widely used in health promotion and smoking cessation programs is the transtheoretical model or Prochaska and Velicer's "stage-of-readiness-to-change model" (1997). This model distinguishes different stages in the motivation to change, from precontemplation (in which the individual has no plans to change routines in the near future) through contemplation, preparation, action, maintenance, and completion (the stage in which the new behavior is incorporated into the routine). Stages-of-change theories have been tested particularly in studies on changing patients' behavior. A review of thirty-seven RCTs (randomized controlled trials) showed little evidence that interventions based on a stage-of-change model were more effective than other interventions aimed at changing patients' behavior (Riemsma et al. 2003).

By summarizing and synthesizing the different step-by-step models described in the literature (table 3), we developed a ten-stage model for planning change (table 4), which has been used in a number of studies (Grol and Wensing 2004). At each stage, different problems in changing patient care may be identified, and different change interventions may be selected and tested.

Impact Theories

Impact theories describe the hypotheses and assumptions regarding how a specific intervention will facilitate a desired change; that is, they describe the causes and effects and the factors determining success or the lack thereof in improving care. Here we present a set of theories for different (ecological) levels of health care using different hypotheses for effective change in health care. Table 5 summarizes these theories, hypotheses, and change interventions. To illustrate the different theories, we use the two earlier examples, changing hand hygiene routines and managing diabetes.

Theories Focused on Individuals

Theories of factors related to changes by individual professionals in health care focus on the way that they (physicians, nurses, managers, etc.) make choices or decisions, their knowledge or skills or lack thereof,

TABLE 4
A Ten-Stage Model for Planning Change: Possible Barriers to Change and Possible Strategies and Interventions

Stage	Possible Barriers to Change	Possible Strategies and Interventions
Orientation		
1. Awareness of innovation	Not familiar, does not read literature, no contact with colleagues	Distribute brief messages via all types of channels; approach key figures and networks
2. Interest, involvement	No sense of urgency, does not see it as relevant	Attention-catching brochure; personal approach and explanation; confrontation regarding performance
Insight		
1. Understanding	No knowledge, information too complex or too extensive	Good instruction materials, concise messages; information based on problems in practice; regular repetition of message
2. Insight into own routines	No insight, overestimation of own performance	Simple methods of audit and feedback on performance; comparisons of data with peers
Acceptance		
1. Positive attitude	Sees disadvantages, doubt about value or developers, not attracted to change	Adapt innovation to wishes of target group, with local discussion and consensus; discuss resistance; provide good scientific arguments; involve key individuals and opinion leaders
2. Decision to change	Doubt about feasibility, success, and own efficacy	Have peers demonstrate feasibility; detect bottlenecks, seek solutions, and propose feasible objectives for change
Change		
1. Actual adoption, tryout	Not starting, no time, lack of skills, does not fit into fixed routines	Extra resources, support, training in skills, redevelopment of care processes, temporary support or consultants, information materials for patients
2. Confirmation of value	Insufficient success, negative reactions of others	Devise plan with feasible objectives for change, inventory of bottlenecks, and finding solutions
Maintenance		
1. New practice integrated into routines	Relapse, forgetting	Monitoring, feedback, and reminder systems; integration in routine care plans and local protocols
2. New practice embedded in organization	No support, no budget	Provide resources, support from top management, organizational measures, rewards, payment for certain tasks

Note: The ten-stage model is a synthesis of different stages of change models presented in the literature, including examples of possible barriers to change and possible change strategies.
Source: Grol and Wensing 2005a and b.

TABLE 5
Overview of Theories on Change in Health Care, Hypotheses Derived from These Theories, and Possible Interventions

Theory	Hypotheses Derived from Theory on Changing Practice	Possible Interventions (Applied to Hand Hygiene and Diabetes Examples)
Individual professionals		
Cognitive theories	Implementation of change needs to take into account professionals' decision processes, and they need good information and methods to support their decisions in practice.	Provide convincing and timely information to professionals on desired care, and support their decision making on hand hygiene routines or diabetes management.
Educational theories	Implementation of change should be linked to professionals' needs and motivation; intrinsic motivation is crucial; people change on basis of experienced problems in practice.	Involve professionals in finding solutions for the problem; define personal targets for improvement as well as individual "learning plans" related to desired performance.
Motivational theories	Implementation of change needs to focus on attitudes, perceived social norms, and experienced control related to desired performance.	Convince professionals of importance of better hand hygiene or diabetes care; show that they can do it and that others find it important that they do it.
Social context		
Theories of communication	Importance of the source of innovation (credibility), the framing and rehearsal of messages, and the characteristics of the messages' recipient.	Develop very convincing message, have credible persons present it, and adapt message to receiver's competence and motivation.
Social learning theory	Changing performance takes place through demonstration and modeling and through reinforcement by others.	Have hand hygiene or best practices in diabetes care modeled by "leaders" and desired routines reinforced by respected peers.
Social network and influence theories	Change demands local adaptation of innovations and use of local networks and opinion leaders in dissemination, including identifying innovators and key persons in the social network.	Study the interaction in the team; determine the opinion leaders; and use these to improve infection control or diabetes management.
Theories related to teamwork	More effective teams are better able to make necessary changes to improve care because they share goals and are able to share knowledge.	Create teams in which roles are defined and people encourage one another to work on the common goal of fewer infections or complications in diabetes patients.
Theories of professional development	Professional loyalty, pride and consensus, and "reinvention" of change proposal by professional body are important.	Use professional pride and define professional standards for the desired performance.
Theories of leadership	Involvement and commitment of leaders and (top) management in change process are important.	Have top management or informal leaders initiate activities and provide continuous support aimed at changing routines in diabetes care or hand hygiene.

(Continued)

TABLE 5—*Continued*

Theory	Hypotheses Derived from Theory on Changing Practice	Possible Interventions (Applied to Hand Hygiene and Diabetes Examples)
Organizational context		
Theory of innovative organizations	Implementation should take into account the type of organization; decentralized decision making (teams) about innovation is important.	Create broad coalitions of clinicians from different wards to change the systems for infection control or diabetes care; increase responsibilities for the wards.
Theory of quality management	Improvement is a continuous cyclic process, with plans for change continually adapted on the basis of previous experience; organization-wide measures are aimed at improving culture, collaboration, customer focus, and processes.	Reorganize work processes around diabetes care or infection control; develop primary care or hospital-wide system for optimal diabetes care or for prevention of infections; monitor progress and continually adapt plans for change on the basis of data.
Theories of integrated care	Change multidisciplinary care processes and collaboration instead of individual decision making.	Analyze and redesign the work processes related to diabetes care or hand hygiene, and make these more effective and efficient.
Complexity theory	Focus on system as a whole, find patterns in behavior (attractors) and link change plan to these, and test and improve the plan.	See infection control or diabetes management as a system with many agents; find patterns/attractors; define crucial (minimum) specifications for change; and test them.
Organizational learning theory	The creation or availability of conditions in the organization for continuous learning at all levels can lead to successful changes.	Offer continuous learning and exchange of information about diabetes management and better hygiene at all levels of the organization.
Theories of organizational culture	Changes in the culture can stimulate changes in performance, particularly a culture of teamwork, flexibility, and external orientation.	Work on improving the general culture in the hospital or at the wards, in which infection control and integrated care for diabetes patients are seen as priorities.
Political and economic context		
Reimbursement theories	Attractive rewards and (financial) incentives can influence the volume of specific activities.	Reward the decrease of infections or achievement of diabetes care targets with nonmaterial or material/financial incentives (extra budget, staff, sabbatical leaves).
Theory of contracting	Contractual arrangements can guide professional and organizational performance.	Provide contractual arrangements of purchasers and care providers related to diabetes control or meeting of infection targets.

their attitudes and motivation, or their routines and habits in their daily professional life (see table 5).

Cognitive Theories

Rational Decision Making. Cognitive theories of change management focus on the (rational) processes of thinking and acting by individual professionals. Rational decision-making theories assume that in order to provide optimal care, professionals must consider and balance the advantages and disadvantages of different alternative behaviors. Such theories regard the provision of convincing information about risks and benefits and pros and cons as crucial to performance change. In our example of hand hygiene, these theories would view the lack of compliance with existing evidence-based guidelines as primarily a knowledge and decision-making problem, seeing the professionals as not well informed about or not convinced of the scientific evidence regarding the consequences of inappropriate hand hygiene. That is, the physician may not perceive the benefits of regular washing as outweighing the disadvantages of the extra time it takes. Providing relevant and convincing information would therefore be the preferred strategy.

Other cognitive theories are more descriptive and illustrate how decisions are actually made. One cognitive-psychological approach states that clinicians do not act rationally but instead decide on the basis of their previous experiences and contextual information (Schmidt 1984). When they diagnose a health problem, they use so-called illness scripts, or cognitive structures in which they have organized their knowledge of a specific health problem and in which they see their previous experiences with specific patients as crucial to further decisions. The theory is supported by research showing that experienced doctors diagnose patients more quickly and use contextual information better in their diagnosis (Botti and Reeve 2003; Hobus 1994; van Leeuwen et al. 1995). The problem is, of course, that professionals may also use obsolete information or inadequate experiences as the basis for their performance (change) (Choudry, Fletcher, and Soumerai 2005).

Consistency. Other theories describe cognitive mechanisms that may prevent rational decision making. For instance, people prefer consistency in thinking and acting and so make choices that may not be rational but fit existing opinions, needs, and behaviors (Festinger 1957). Thus, if

they do not like repeated hand washing or doubt its effects, they may interpret or seek information that confirms their beliefs. People may also seek an external explanation for specific events (infections) or behaviors (poor hand hygiene) instead of an internal explanation in order to make it more acceptable to themselves or to fit it better to their existing perceptions (Jones et al. 1972).

In sum, cognitive theories explain poor hand hygiene in terms of health professionals' lack of relevant (scientific) information, incorrect expectations about the consequences of their behavior, or attributions of infections to causes outside their control. Therefore, to change performance, it may be important to concentrate on how professionals think and make decisions about their daily work and support more effective ways of decision making, for instance, by supplying detailed guidelines, decision aids, and evidence-based clinical pathways and protocols.

Educational Theories

Problem-Based Learning. Most educational theories focus less on cognitions and more on the motivation to learn (and change). For instance, adult learning theories state that people learn better and are more motivated to change when they start with problems that they have had in practice than when they are pressured or confronted with abstract information like guidelines (Holm 1998; Mann 1994; Merriam 1996; Norman and Schmidt 1992). Most health care professionals have a large reservoir of specific experiences that they can use as a source for learning and changing (Smith, Singleton, and Hilton 1998). Differences between novices and experts in health professions have been reported (Botti and Reeve 2003; van Leeuwen et al. 1995). Such principles of "problem-based," "self-directed," and "portfolio learning" might be used effectively to implement change or innovations in health care, although the fundamental assumptions behind the theory remain largely speculative and not based on scientific evidence (Norman 2002).

For example, in order to improve diabetes care, the care providers first need to experience a problem (e.g., that their behavior may lead to complications in patients) and then need to be motivated to do something about it. Here the theory offers a framework in which to structure a discussion, identifying and applying past experiences to solve this complicated problem within the current work setting. Not all care providers

have the competence or motivation for self-directed learning, and at least one important component of adult learning, self-assessment, has proved to be very difficult to achieve (Norman 2002). Professionals may also have different motives in regard to (self-directed) learning and changing (Fox and Bennett 1998; Stanley, al-Shehri, and Thomas 1993; Tassone and Heck 1997), such as a desire for more social interaction, for meeting external expectations (including pressure from patients or colleagues), for better serving others or society, for increasing professional competence or professional status, for financial rewards, or for relief from boring routines or job frustrations. In order to improve the management of diabetes, it is important to understand—and address—such motives.

Learning Style. Another factor seen as important to change is professionals' personal learning style. Lewis and Bolden (1989) described four styles: *activist* (people who like new experiences and therefore accept but also abandon innovations quickly), *reflective* (people who want to consider all options very carefully before changing), *theoretical* (people who prefer rigorous analysis and thought before changing), and *pragmatic* (people who prefer to act on the basis of practical experience with an innovation). These different learning styles in health care professionals have been reported in several studies (e.g., Delva et al. 2002; Lewis and Bolden 1989; Nylenna, Falkum, and Aasland 1996). Accordingly, a program to improve diabetes care or hand hygiene should take into account personal learning styles as well as professional individual learning needs and personal motives.

Motivational Theories

Several theories focus specifically on "a motivation to change," emphasizing attitudes, perceptions, and intentions regarding the desired performance (Ajzen 1988; Fishbein and Ajzen 1975; Kok et al. 1991). For instance, the "theory of planned behavior" states that any given behavior by professionals is influenced by their individual intentions (or motivation) to perform the specific behavior and that these intentions are determined largely by attitudes toward the behavior, perceived social norms, and perceived control related to the behavior (Ajzen 1991). Attitudes toward a specific behavior, such as hand washing before and after each contact with a patient, are determined by the expected outcomes of the behavior and the positive or negative appraisal of these outcomes (i.e.,

whether it is worth the extra effort). The perceived social norms are influenced by the behavior of other professionals (particularly physicians), for example, whether they wash their hands regularly. The perception or expectations of control or self-efficacy (Bandura 1986; Bandura 1997; Maibach and Murphy 1995) represents the belief that one can really achieve the desired change in the specific setting (e.g., regular hand washing under time pressure). Self-efficacy expectations can be related to the behavior itself ("Am I able to do this?"), to the social context ("Can I resist social pressure?") and the pressure related to the behavior ("Can I perform the behavior under tension?").

Implementation strategies can address all these factors, although the motivational theories have been used mainly in the field of health promotion. Mann (1994) found that physicians' self-efficacy expectations regarding the prevention of cardiovascular disease influenced their efforts in this area, and Walker, Grimshaw, and Armstrong (2001) used this theory of behavior in a study of physicians' intentions to prescribe antibiotics to patients presenting with an uncomplicated sore throat. The relation between physicians' beliefs and attitudes and their intention to prescribe was strong (correlation .69).

Theories Related to Social Interaction

Most of the theories related to social interaction discuss determinants of change in the interaction between an individual professional and others, such as the influence of key individuals and opinion leaders, participation in social networks and teams, and the role of leadership (see table 5).

Theories about Communication

Several theories focus on effective communication aimed at changing individual attitudes and behaviors. For instance, the Persuasion-Communication Model presents a stepwise model of persuasion: exposure to a message, attention to that message, comprehension of the arguments and conclusions, acceptance of the arguments, retention of the content, and attitude change (McGuire 1985). Communication should be adapted for each of these steps to be successful (see "Process Theories"). Both factors in the source of the message (e.g., credibility, status) and

in the recipient (e.g., intelligence, prior knowledge, involvement) are important.

Alternative models are the Elaboration Likelihood Model (Petty and Cacioppo 1986; Petty, Wegener, and Fabrigar 1997) and the Heuristic Systematic Model (Eagly and Chaiken 1993). They distinguish two routes of information: a central or systematic process, in which a message is carefully considered and compared with other messages and beliefs, and a peripheral or heuristic process, in which a message is less intensively considered and individuals are more responsive to peripheral cues, such as the source and format of the message and the reaction of others. Changes induced by the central, systematic route are likely to persist longer. Important factors associated with the persuasiveness of a message include (Burnstein 1982; Petty and Wegener 1998) repetition of the message, novelty, perceived validity, message training, personal relevance, and functionality.

Various studies have investigated the importance of source and message factors and the role of thoughtful information processing (Bartholomew et al. 2001; Petty, Wegener, and Fabrigar 1997), although research in health care settings is limited. Related to our example of hand hygiene, we may hypothesize that a program aimed at improving hand hygiene routines must include very convincing messages repeatedly presented by credible persons and that the target group has the opportunity to absorb these messages and has the time to understand and accept them.

Social Learning Theory

Bandura's "social cognitive theory" (1986) is an extension of classic behavioral theories and explains the behavior of individuals in terms of personal factors, behavioral factors, and context-related factors. Important contextual factors are material or nonmaterial rewards from others (e.g., positive feedback from peers or opinion leaders) as well as modeling of the behavior by others. *Modeling* means that an individual can observe in others that it is possible to perform the desired behavior and that it will lead to the expected results. The basic assumption of this theory is that there is a continuous interaction among a professional, his or her performance, and the social environment, which reinforce one another in changing performance. In our example of inadequate hand hygiene,

this theory particularly addresses the issue of care providers observing one another and the performance of the "leaders" in the setting, as well as the importance of (positive) reinforcement of the desired performance by respected peers.

Social Network and Influence Theories

Theories of the diffusion of innovations state that the adoption of new ideas and technologies is largely influenced by the structure of social networks and by specific individuals in or at the margins of these networks (Rogers 1995). Research on networks has explored the influence of the strengths of the links between individuals within a network and the threshold effects of adopting innovations. Relevant network characteristics that may influence an effective transfer of information are the strength of the ties between members of the network, the differences between interacting individuals (in networks of like individuals, innovations are less likely to be adopted), and the proportion of the population that has already adopted an innovation (Gladwell 2000; Valente 1996). Related to social network theories are "social influence theories," which stress existing norms and values in the social network of professionals. Performance in daily practice is assumed to be based not on a conscious consideration of the advantages and disadvantages of specific behavior but on the social norms in the network that define appropriate performance (Greer 1988; Mittman, Tonesk, and Jacobson 1992). Change often takes place only after a local consensus is achieved. Interactions within the social network, the views and expectations of significant peers, and the availability of education all are important to an effective implementation of innovations or changes.

Opinion Leaders. Local opinion leaders are particularly important to social network and social influence theories, as they are considered to be respected persons with great influence in their field or setting. Although they are not necessarily the innovators, they are regarded as role models within the network, and they act as facilitators, supporters, and problem solvers in the change process. Through their place in the network and their informal contacts, they can help disseminate information. Opinion leaders represent the social norms within the network, and others trust them to compare innovations with the existing norms and demands of the local situation. In health care, a number of studies (Grimshaw et al. 2006; Grimshaw, Greener, and Ibbotson 2000; Stross

1996) have confirmed the presence of such important key persons. But the use of opinion leaders has shown mixed effects on the quality of care (Grimshaw et al. 2004; Thomson O'Brien et al. 2000; Berner et al. 2003; Klevan, Rolnick, and Talarico 1999; Shafer et al. 2002; Wyatt et al. 1998).

A program using social influence theories to improve diabetes management in hospitals or practices would need to study the interactions within the teams, the opinions of the teams' leaders, and the way that people influence one another. It would need to focus on recruiting key individuals in the network and giving them a modeling role and on exchanging information or staff between teams and practices that have changed their performance and those that have not.

Theories Related to Team Effectiveness

Although the importance of teamwork to achieving organizations' aims was established at least seventy years ago, it is only in the past twenty years that large organizations have taken up this idea widely. Teamwork is seen as a way to tackle the fragmentation of care and to generally improve patients' quality of both primary and hospital care (Clemmer et al. 1998; Firth-Cozens 1998). Increasingly, teams are used to improve care for specific groups (Shortell et al. 2004; Wasson et al. 2003), such as patients with a chronic disease. The success of teams relies on their working toward a common, clear goal. Effective teams help clinical systems do their work, define and assign tasks and roles, train individuals to perform tasks, and establish clear structures and processes for communication (Grumbach and Bodenheimer 2004). Factors that influence teamwork include the presence of a team champion (Shortell et al. 2004), information sharing and trust (Firth-Cozens 1998), team vision, participative safety (how much the team participates in making decisions and whether team members feel psychologically safe in proposing new ideas), task orientation (the commitment of team members to perform as well as possible), support for innovation (West 1990), and "structural factors" such as team size, group composition (mix of skills), and geographical proximity or separation of the team (Firth-Cozens 1998).

Among the many observational and experimental studies of group functioning outside health care, a meta-analysis of thirty studies shows that group performance is negatively correlated with group conflicts (De Dreu and Weingart 2003). In health care settings, observational

studies that use the Team Climate Inventory (Bower et al. 2003; Loo 2003; West 1990) suggest that the team's cohesiveness predicts effectiveness. Studies in hospitals found that better team functioning was significantly associated with lower mortality rates (Wheelan, Burchill, and Tilin 2003) and the mean length of stay for general surgery patients (Friedman and Berger 2004). These theories suggest that efforts should be aimed at encouraging team collaboration in health care. In diabetes care, for example, teams should set targets, such as optimal follow-up levels of diabetes patients, and work together—have regular contact, share experiences—to achieve this goal.

Theories of Professional Development

Health professionals have knowledge that is not easily accessible to nonprofessionals and that is highly valued by society because of its practical relevance to people. Theories of professional development address the development of professions and professionals, including factors that may influence changes in professional behavior (Freidson 1970; Mintzberg 1996). Professions monopolize practice in their field of work and have some autonomy in professionals' decisions. Indeed, access to the professions is based on vocational training and examinations that are controlled by members of the profession. Professional development thus can influence behavior change in different ways. First, collective professional standards influence the behavior of individual professionals, so innovations that accord with these standards are easier to implement. Members of professions tend to be loyal to the profession rather than to the organizations in which they work (Mintzberg 1996). Professions also produce, assess, and transfer new knowledge in their field through research and the transfer of knowledge. Therefore, innovations that are consistent with the developing body of knowledge in a profession are more likely to be implemented than other innovations. Nonetheless, empirical research on professional development in health care and its impact is limited and tends to be descriptive and exploratory.

For our hygiene example, this theory emphasizes the importance of using membership in professional organizations, professional pride, professional standards, and professional loyalties to transfer the idea to individual professionals that something needs to be done about poor hand hygiene.

Theories of Leadership

Both formal and informal leaders can be very influential in changing clinical practice or implementing new procedures or processes. Effective leadership is believed to promote, guarantee, or (in some circumstances) block an innovation. Such power or influence can be based on holding formal authority; controlling scarce resources; possessing the information, expertise, or skills needed to achieve valued aims; being part of a strong social network; or belonging to a dominant culture (Donaldson 1995). A "clinician leader," for example, may be a full-time manager but may also have informal influence (such as that of a respected senior physician or nurse) (Ovretveit 2004). Specific types of leadership probably are effective for particular innovations in particular settings. For instance, changing the culture of a hospital to prevent infections may require a different leader than to implement a new operation technique or a new approach to diabetes management in primary care. Situation-specific factors influencing the impact of leadership may include the leader's level in the organization, the type of organization, whether one is a formal or informal leader, the organization's stage of "quality development," and the organization's economic, political, and social conditions. Strategies that consistently improve quality include engaging physicians; training personnel; building systems; effective delegation and accountability; personal involvement and modeling of values; a flexible strategy with resources; and creating a vision (Ovretveit 2004). Ovretveit's review concludes that evidence supports the importance of leadership for quality and safety improvement, although the evidence is not conclusive and only a few controlled studies have tested specific hypotheses (Ovretveit 2004). Also, evidence from other sectors regarding leadership may not apply to health care (Ham 2003). Therefore, the effective implementation of guidelines for hand hygiene requires understanding who an organization's or team's formal and informal leaders are, how they use their power or influence, and how they can best use it in a plan aimed at better infection control.

Theories Related to the Organizational Context

Several theories see the opportunity for change in patient care in terms of structural or organizational conditions and reforms, such as the better

organization of care processes, a different division of tasks and roles, and change in the culture in the work setting or the collaboration among professionals (see table 5).

Theories of Innovative Organizations

Theories of innovative organizations focus on those characteristics of organizations that determine whether and to what extent they are able to implement innovations (Wolfe 1994). Some organizations adopt innovations more quickly and easily than others. Innovativeness seems to be associated with highly specialized individual roles, a high level of professionalism, decentralized decision making, easily available technical knowledge within the organization, good internal and external communication, and a positive attitude toward change among leaders and managers (Damanpour 1991). Such characteristics of innovative organizations seem to differ, however, between commercial and not-for-profit organizations, between industry and service organizations, and between single and multifaceted innovations. Scott (1990) applied models derived from organizational sciences to health care organizations, with an emphasis on the types of innovation (e.g., medical technical or administrative change) and the types of health care organizations. More innovations were found in larger and in specialized hospitals (Frambach and Schillewaert 2002; Scott 1990). But a study of the relationship between the size and performance of primary care practices showed little evidence for such association (Wilkin et al. 2003). More technological innovations were observed in hospitals with larger budgets, and more administrative innovations were seen in hospitals with smaller budgets (Scott 1990). Contacts between institutions also influenced the extent to which innovations spread.

Using Scott's types of innovation, the improvement of hand hygiene requires both technical (e.g., new equipment or materials) and administrative innovations (monitoring systems for infections, new guidelines, arrangements at the team level) involving coalitions of various clinicians in different wards. Participation and self-responsibility in wards should be promoted, and new ideas and best practices for improving hand hygiene should be disseminated among the wards.

Theory of Total Quality Management

Total Quality Management (TQM), sometimes entitled Continuous Quality Improvement (CQI), emphasizes the continuous improvement

of (multidisciplinary) processes in health care in order to better meet customers' needs (Blumenthal and Kilo 1998; Shortell, Bennett, and Byck 1998). Inadequate performance is seen not as an individual problem but as a failure of the system, so real change can be achieved only by changing the system (Berwick 1989). Changing the organizational culture, identifying the leadership, and building a team are components of this approach. It was introduced into health care around 1990 after its successful use in other industries (Batalden and Stoltz 1993; Berwick 1989; Berwick, Godfrey, and Roessner 1990; Laffel and Blumenthal 1989). The basic principles of TQM are (Berwick and Nolan 1998; Plsek, Solberg, and Grol 2003) comprehensive, organization-wide efforts to improve quality, a focus centered on the patients (or customers), continuous improvements and redesign of care processes by encouraging alternating cycles of change followed by relative stability, management by facts, a positive view of people (whereas some people see individual professionals as the cause of all problems and inefficiencies, TQM sees them as the ultimate source of knowledge of how to improve work), ongoing training for all staff, and a key role for the leadership. PDSA cycles (Plan-Do-Study-Act cycles) to improve the provision of care (continuous learning about change by introducing a change and reflecting on it) also are an important tool.

Relating the theory to our example of improving diabetes care, we would concentrate not so much on professional behavior but more on understanding the organization's care processes (in outpatient clinics or primary care practices) related to diabetes, setting ambitious targets for improving health outcomes and preventing complications, stimulating team building, and applying PDSA cycles while monitoring progress made. The organization's leaders must support these activities and create a culture in which such change is possible.

The evidence supporting Total Quality Management is limited and comes mostly from observational studies (Counte and Meurer 2001). In an analysis of successful quality-improvement projects, Gustafson and Hundt (1995) showed the importance of "customer and quality mindedness," collecting data, a supportive management, and staying consistent to be effective. Shortell, Bennett, and Byck (1998) reviewed fifty-five studies of the effects of TQM, found only three studies with a controlled design, and concluded that there still is little evidence of hospital-wide effects of TQM on patient care. A more recent study of the impact of TQM on outcomes for patients having bypass surgery also showed inconsistent results (Shortell et al. 2000).

Theories of Integrated Care

Change of Processes of Care. In line with the TQM approach, theories of integrated care stress the radical or gradual redesign of the steps in providing care. Models for changing processes, such as Business Process Redesign (BPR) and disease management, focus on improved organizing and managing the care of specific categories of patients so that their needs are more readily met and costs are reduced. Change is often better achieved by redesigning multidisciplinary care processes than by influencing professional decision making. It usually includes top-down, management-driven approaches in which current practices and processes are analyzed, reconsidered, and basically redesigned (Rogers 2003). These approaches often include organizing new collaborations of care providers, allocating tasks differently, transferring information more effectively, scheduling appointments and contacts more efficiently, and using new types of health professionals. The patients and their diseases are the focus rather than the interests of the various care providers and professionals (Hunter 2000). Often one person (case manager) coordinates the process. Specific guidelines and care pathways are used to determine exactly what part of the care should be provided by whom, at what time, and in what setting. Traditional boundaries between disciplines are thereby less relevant, and multidisciplinary collaboration is crucial.

Multidisciplinary Collaboration. Wagner (2000) found that effective chronic care generally relied on multidisciplinary teams. Physicians' responsibilities can be delegated to other team members to ensure that critical elements of the care for which doctors may not have adequate training or time are performed competently. Successful intervention programs for chronic patients share several characteristics (Casalino et al. 2003; Ouwens et al. 2005; Wagner, Austin, and van Korff 1996), such as case management, performance feedback to individual care providers, use of explicit protocols and pathways, use of disease registries, electronic or chart-based reminder systems, and reorganization of the practice to better meet patients' needs. A growing number of studies show that the integrated, multidisciplinary management of chronic conditions can be effective (Wensing, Wollersheim, and Grol 2006). To improve the management of diabetes, these approaches imply that care should be seen as a series of related actions performed by different professionals and that this process should be analyzed and, as necessary, redesigned.

Detailed critical pathways, multidisciplinary collaboration, allocation of tasks, coordination of activities, and a monitoring and feedback system may support the improvement.

Complexity Theory

Complexity theory refers to systems behavior and systems change, starting from the assumption that because the world of health care has become increasingly complex, it is important to observe and improve systems as a whole instead of dividing them into parts or components. This theory sees hospitals, primary care teams, or care organized around a specific disease or problem (stroke, diabetes, infection control) as "complex adaptive systems," defined "as a collection of individual agents (components, elements) with the freedom to act in ways that are not always totally predictable, and whose actions are interconnected, so that one agent's actions changes the context for other agents" (Plsek and Greenhalgh 2001, 625). Such characteristics can also be seen in a flock of birds, a colony of termites, a family, the financial market, or the immune system. The many components of complex systems continuously interact, and these interactions are more important than the discrete actions of individual agents or components (Sweeny and Griffiths 2002). Such systems cannot be adequately understood by analyzing their constituent parts.

One implication of complexity theory is that comprehensive plans with detailed targets for parts of the systems seldom improve patients' care in complex systems. The focus thus should be on the system as a whole with simple goals or minimal specifications (Plsek and Wilson 2001), because the behavior of a complex system is usually very unpredictable over time, and small influences in one part of the system often have a large impact elsewhere in the system or even outside the system. For example, infection control in a hospital, including hand hygiene routines, may be seen as a complex system with many components and agents influencing one another. According to complexity theory, it is important not to concentrate on single parts of this system, such as nurses' hand-washing routines, Rather, it is important to set broad targets for change (such as reducing the hospital-acquired infection rate by 50 percent), observe the system as a whole, find a few major incentives, link the actions to them, and test their impact to learn more about how

to meet the targets. Complex adaptive systems have been the focus of study across a variety of scientific fields over the past forty years, but despite a few illustrative cases of its impact, there has been little systematic observational or experimental research in health care.

Theory of Organizational Learning and Knowledge Management

A "learning organization" has been defined as "an organization skilled at creating, acquiring and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights" (Garvin 1993, 80). Most of those who have written about organizational learning agree that both individuals and organizations learn. Individuals learn as agents for the organization, and their knowledge is stored in the organization's memory (e.g., embedded in routines) (Örtenblad 2002). Learning is seen as a characteristic of the organization because it retains knowledge and expertise even after individuals leave (DiBella, Nevis, and Gould 1996; Garside 1998; Nevis, DiBella, and Gould 1995). The boundaries between theories of "organizational learning" and "knowledge management" are unclear. A review of the organizational literature on both concepts showed that learning organizations are mostly associated with training, organizational development, and human resources development and that knowledge management is mostly associated with information technology, intellectual capital, and the use of information systems (Garavelli, Gorgoglione, and Scozzi 2002; Scarbrough and Swan 2001). Central to both theories is the idea that only through individuals' learning are organizational routines changed. Therefore, to improve an organization's learning ability, favorable conditions for individuals' learning must first be created (Lähteenmäki, Toivonen, and Mattila 2001; Senge 1990).

Organizations usually have formal and informal structures for the acquisition, dissemination, and integration of knowledge (Nevis, DiBella, and Gould 1995). Whether these structures are effective depends on the organization's culture. Learning organizations are characterized by an experimental mind-set; curiosity about trying new things; a climate of openness; acceptance of debate and conflict; an ongoing commitment to education, growth, and development at all levels; and involved leaders (Lähteenmäki, Toivonen, and Mattila 2001). A key principle for learning organizations is what Argyris and Schön (1978) refer to as "double loop

learning": the practice of responding to error not merely by recognizing the error and adjusting performance to prevent its recurrence but by using the opportunity to review the assumptions that set the rule in the first place.

On the basis of these theories, we hypothesize that improving hand hygiene routines will be particularly successful in learning organizations, in which effective infection control belongs to the collective expertise of the hospital or the primary care setting; people at different levels are eager to learn about best practices in infection control; and experiences with and information about better performance are shared by units, teams, practices, and hospitals. Even though numerous practical tools are available to help organizations become "learning organizations," the concept remains somewhat vague (Lähteenmäke, Toivonen, and Mattila 2001), and there has been no empirical research on the theory as applied to health care.

Theories about Organizational Culture

The interest in theories regarding organizational culture is based on the assumption that it is related to performance and that an organization's culture can be altered to change performance (Scott et al. 2003b). As a consequence, there is increasing interest in managing organizational culture as a way to improve health care (Scott et al. 2003a). But scholars do not agree on the precise meaning of "organizational culture." Among the many overlapping and competing definitions, two broad streams can be distinguished. The first sees culture as "something an organization possesses," an "attribute," and the second stream tends to regard "culture" as defining the whole character and experience of organizational life ("organization is culture") (Scott et al. 2003a). According to Schein (1985), organizational culture is not automatically created when an organization is created. Instead, to form a culture, a group must have stability, shared experience, and history. Over time, the group learns to cope with its problems of external demands and internal integration and teaches these values and underlying assumptions to new members. Therefore, culture consists of not only observable features (such as a company's mode of dress) but also a body of tacit knowledge (information that people unconsciously possess).

A widely used conceptual model to describe different types of organizational culture is "the competing values framework" (Quinn and

Rohrbaugh 1981), which describes the degree to which the organization emphasizes change or stability and internal or external orientation. The model's four ideal cultural orientations are (1) a group or clan culture, emphasizing flexibility and change and characterized by strong human relations, teamwork, affiliation, and a focus on the internal organization; (2) a developmental culture, emphasizing growth, creativity, flexibility, and adaptation to the external environment; (3) a rational culture, externally focused but control oriented, emphasizing productivity and achievement and external competition; and (4) a hierarchical culture, stressing stability especially in the internal organization, uniformity, and a close adherence to rules (Stock and McDermott 2001).

To improve quality, health care organizations may need to develop a quality culture that emphasizes learning, teamwork and customer focus (Ferlie and Shortell 2001). Methods for promoting a quality culture all seem to start with the leadership's embracing the promotion of quality through the articulation of the organization's mission and vision, the engagement of people throughout the organization in quality, and attention to learning (Boan and Funderburk 2003). Several studies confirm the relationship between organizational culture and health care performance (Scott et al. 2003b; Shortell et al. 1995). For example, cultures stressing group affiliation, teamwork, and coordination were associated with greater improvement in quality and better functional health of coronary artery bypass graft patients, whereas cultures stressing formal structures and regulations appeared to be negatively associated with quality-improvement activities.

To improve hand hygiene routines, this theory would emphasize creating an organizational culture that encourages the improvement of such routines. Hand hygiene should be made part of the hospital's mission, and specific activities need to be undertaken to establish safety and infection control as a priority of the whole organization.

Theories Related to the Political and Economic Context

Theories that focus on the wider environment can encompass determinants of organizational change related to regulation, insurance systems, markets, and other factors outside the organization. Although changing these factors is generally out of reach of those within the organization who are involved in improving health care, identifying their presence still may be important when planning change (see table 5).

Reimbursement Theories

Economic theories are based on the premise that individuals and organizations make decisions in order to optimize their goals and to reduce risks. Changes in the reimbursement of health care providers and in cost sharing by patients can be used to influence professional or organizational performance, and they may influence whether a specific innovation is implemented (Barnum, Kutzin, and Saxenian 1995). For example, health care systems have different reimbursement methods (Barnum, Kutzin, and Saxenian 1995), and more variations have been proposed (Shaughnessy and Kurowski 1982; Sonnad and Foreman 1997). Prospective reimbursement systems (salary, budget, capitation, subscription) differ from retrospective systems (fee-for-service). Fee-for-service leads to additional actions, so targeted payments can be used to stimulate specific activities, such as supervising diabetes patients. Prospective systems, in contrast, put financial risk on the side of the provider and have shown to reduce the volume of care (prescriptions, admissions to hospital, etc.) (Chaix-Couturier et al. 2000). They may also lead to less attention to patients, waiting lists, selection of low-risk patients, or use of cheaper, less effective treatments (Barnum, Kutzin, and Saxenian 1995; Shimmura 1988). Pay-for-performance methods have been proposed as one strategy designed to correct the effect of incentives that may encourage poor quality care. A number of reviews have studied the effect of different payment methods on the quality of care (Armour et al. 2001; Dutley et al. 2004; Town et al. 2005), finding mixed results. Nevertheless, an inventory of the number of U.S. pay-for-performance programs counted 105 in 2005, a number that will rise to approximately 160 in 2006 (Sorian 2006).

In our example of improving hand hygiene routines, the pay-for-performance method could use the financial cost of hospital infections to press for change. For instance, a hospital may be given a fixed budget for preventing infections, putting the financial risk on the hospital. Or targeted payments may be used to supply necessary materials (soap, washing shrinks, etc.).

Theory of Contracting

Contracting is based on the assumption that "purchasers" (health insurers, authorities, etc.) can influence health care services by assessing the needs of populations and setting the priorities of groups and services. For example, contracts may be related to the organization of diabetes care in a specific region and to meeting defined targets for diabetes control (such

as blood pressure, cholesterol, and HbA1c levels). Purchasers would be asked to translate their aims, including any quality standards that services should meet, into contractual specifications (Allen et al. 2002). The use of contracts is an example of governing agency relationships in the public sector (in which the purchasers are the principals and the care providers are the agents). The care providers' response to contracting may include service diversification, introduction of management information systems, employment of contract managers, use of clinical guidelines, and initiation of quality management activities or enhanced discharge planning (Kirkman-Liff et al. 1997). For instance, this theory predicts that clinical guidelines are most often introduced when the contract locates the financial risk on the side of the care provider (e.g., capitation, global budget, package pricing). Although including quality targets in contracts with care providers has become increasingly popular in many countries, there has been little research on its impact.

Conclusions and Discussion

Because the introduction of innovation and change in health care is difficult and many current programs for improving care are, at best, only partly successful, we argue that a better use of theoretical assumptions to develop and test plans and interventions to improve patient care may improve our understanding of this very complex and to date largely empirical field.

This article described theories relevant to the implementation of innovations and change in health care practice, and they should enable both researchers and change agents in health care to design better studies and programs to improve patient care. Our overview has made clear that whereas many of these theories describe overlapping factors related to strategies for change, other theories are based on distinctive assumptions about human behavior and behavioral or organizational change.

The empirical evidence of the effectiveness and feasibility of most theoretical approaches to produce the intended change in health care is limited, so it is not easy to draw conclusions about the relative superiority of any theory based on the available evidence from health care contexts. Without such evidence, all approaches would seem to be able to contribute to improving health care, and often different theoretical

perspectives must be considered simultaneously to develop a good plan (Grol and Grimshaw 2003).

Only a few of these theories have been tested in robust research in health care settings, and not all had positive results. Nevertheless, some theories seem to be more suitable and effective for particular changes and innovations. For instance, for specific individual routines—such as regular hand hygiene—cognitive theories that monitor performance, provide feedback, and model behavior by clinical leaders seem to be well supported. But for the optimal management of chronic diseases, integrated care and quality management theories and reimbursement and contracting models seem to be promising. The results of studies testing some of the organizational theories are particularly hopeful. For instance, a wide range of positive outcomes, such as reductions in hospital stay and patient mortality, have been reported as a result of good teamwork and multidisciplinary collaboration in patient care. An examination of the relationship of organizational culture, quality improvement, and selected outcomes in hospitals showed that a flexible, risk-taking culture was associated with more quality-improvement activities and that this was related to better perceived patient outcomes (Shortell et al. 1995). However, some widely used approaches, such as the "stages-of-change theory" of Prochaska and Velicer (1997) or educational theories of "problem-based" or "portfolio learning," still lack robust scientific support (Norman 2002). Our overview of theories is not comprehensive but is a challenge to apply theories from different disciplines to the health care setting.

The Need for Theory-Informed Research

Overall, the lack of scientific work underpinning even some of the most popular models for change in health care is striking. One of our conclusions must therefore be that future studies on change interventions need to focus more on applying specific theories of change to health care. This conclusion agrees with that of Greenhalgh and colleagues (2004), who strongly emphasized the need for more research on mechanisms that determine whether a specific innovation will be successful in a particular health care setting. This will help us discover which theories are helpful for planning change in health care and which are not and which theoretical assumptions are particularly helpful for which purposes. The

results of such research should gradually provide a better understanding of the black box of change in health care.

Making explicit the theoretical assumptions behind the choice of interventions should be important to both researchers and change agents, for a number of reasons. First, the use of theory can offer a generalizable framework for considering effectiveness across different clinical conditions and settings (Eccles et al. 2005). Second, basing interventions or a change program on different theoretical assumptions should prevent overlooking important factors (ICEBeRG Group 2006). Third, a variety of factors at different levels of health care (professional, social context, organizational or economic) usually are important to improving patient care (Ferlie and Shortell 2001; Grol 1997), so hypotheses regarding effective change that are derived from different theories should be useful. More theory-driven research on effective change should ultimately help us decide on the best approaches.

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